Appendix 2

Translation of Taiwan Patent Application No.91221275

Title

Heat Exchange Device

【Abstract of the Invention】

A heat exchange device for cooling an electronic device, includes a tank and a cover hermetically sealing the tank. The tank includes a base and two pairs of opposite sidewalls perpendicularly to the base. An inlet and an outlet are formed on one pair of the two pairs of sidewalls, for coolant entering and exiting the tank. A plurality of uniformly spaced apart inner walls is formed in the tank, thereby defining a channel general in uniform width throughout the tank. A plurality pins is disposed between the inner walls. In the present invention, the inner walls and the pins can increase heat exchange area of the heat exchange device. And due to the channel in uniform in width is throughout the tank, the coolant can traverse over an inner space of the tank, thereby realizing sufficient heat dissipation.

【Background of the Invention】

With development of electronic industry, operating frequency and speed of electronic devices (especial CPUs) are improved rapidly. However, more and more heat is generated by the electronic device, and in company with this, the electronic device has higher and higher temperature, which impacts formal function of the electronic device. In order to keep the electronic device running normally, the heat must be quickly removed from the electronic device. Therefore, numerous kinds of cooling devices are

used to cool the electronic devices.

A conventional cooling device is disclosed in Taiwan Patent No. 486237. Referring to FIG. 3, the cooling device comprises a rectangular tank 22 and a cover 21 hermetically covering the tank 22. A reinforcing rib 23 is formed within the tank 22, the rib 23 spirals from a central portion to a side extremity of the tank 22, thereby defining a channel 24 for passage of coolant through the tank 22. The channel 24 comprises a beginning section 241 and a terminal section 242. The cover 21 forms an inlet 211 directing to the beginning section 241, and an outlet 212 directing to the terminal section 242. Coolant reaches the beginning section 241 via the inlet 211, spirally flows along the channel 24, and then exits the tank 22 via the outlet 212. Therefore, the heat generated by the electronic device is removed by the coolant.

However, contacting area between the coolant and the cooling device is limited, therefore, heat exchange area therebetween is considerable small. And due to the channel 24 being spiral, the coolant flows at different speeds through different sections of the channel 24. A speed of the coolant at a portion of the tank 22 corresponding to the inlet211 is fastest, while, the portion corresponds to the electronic device, the fastest speed of the coolant results in insufficient heat exchange between the coolant and the tank. Conversely, a slow speed of the coolant in other portions of the tank 22 results in sluggishness of the coolant in the tank 22, which results in invalidation of the cooling device to cool the electronic device.

【Features of the Invention】

Accordingly, an object o the present invention is to provide a heat exchange device which can cool an electronic device in effect and has a

large heat exchange area and an even flow of a coolant therein.

In order to achieve the object set out above, a heat exchange device comprises a tank and a cover hermetically sealing the tank. The tank comprises a base and two pairs of opposite sidewalls perpendicularly to the base. An inlet and an outlet are formed on one pair of the two pairs of sidewalls, for coolant entering and exiting the tank. A plurality of uniformly spaced apart inner walls is formed in the tank, thereby defining a channel general in uniform width throughout the tank. A plurality pins is disposed between the inner walls. In the present invention, the inner walls and the pins can increase heat exchange area of the heat exchange device. And due to the channel in uniform in width is throughout the tank, the coolant can traverse over an inner space of the tank, thereby realizing sufficient heat dissipation.

As a further improvement of the present invention, the inner walls parallel to each other and extend alternately from one of the sidewalls and an opposite sidewall. And a distance between a free end of each of the inner walls and a corresponding opposite sidewall is substantially equal to a distance between any two adjacent inner walls, thereby a width of the channel is uniform.

In the present invention, the inner walls and the pins can increase heat exchange area of the heat exchange device. And due to the channel being throughout the tank and having a uniform width, the coolant can traverse over an inner space of the tank, thereby realizing sufficient heat dissipation.

【preferred Embodiment of the Invention】

Referring to FIG. 1, a heat exchange device comprises a tank 10 and a cover 30. The cover 30 is hermetically mounted on the tank 10, thereby

forming the closed heat exchange device. The tank 10 forms an inlet 102 for coolant entering the tank 10, and an outlet 104 for coolant exiting the tank 10.

Referring to FIG. 2, the tank 10 has a base 11 at a bottom thereof. Four holes 112 are defined in four corners of the base 11 for positioning the heat exchange device to a substrate by screws (not shown). The base 11 has a face for contacting to an electronic device (not shown), and an opposite face extending two pairs of opposite sidewalls 122 perpendicular to the base 11, whereby the two pairs of sidewalls 122 define a rectangular frame on the base 11. Alternatively, the sidewalls 122 on the base 11 can define other shaped frame such as cylindrical, terraced shaped and so on.

A plurality of parallel spaced inner walls 132 extend oppositely from inner faces of one pair of opposite sidewalls 122. The inner walls 132 have a uniform distance between two adjacent ones thereof, and height thereof equal to that of the sidewalls 122. A distance between a free end of each inner wall 132 and a corresponding opposite sidewall 122 is substantially equal to the distance between the two adjacent inner walls 132. Thus, a channel 142 is defined between the base 11 and the cover 30 within the tank 10 for coolant flowing therein. The channel 142 is zigzag between the pair of opposite sidewalls 122, thereby the coolant therein traversing over an inner space of the tank 10. Two ends of the channel 142 respectively communicate with the inlet 102 and the outlet 104 of the tank 10. In the case, the inlet 102 and the outlet 104 are respectively formed on two ones of the sidewalls 122, alternatively, they can be formed on a same one of the sidewalls 122, correspondingly, an amount of the inner walls 122 is varied to consist with that.

A plurality of heat dissipating pins 15 extends from the base 11 toward

to the cover 30. In the case, the pins 15 are cylindrical, alternatively, they can be prismy and so on. A height of the pins 15 is equal to or less than that of the sidewalls 122 and the inner walls 132.

In use, the opposite face of the base 11 of the tank 10 contacts to the electronic device and absorbs heat generated by the electronic device. Then the heat in the base 11 is transferred to the inner walls 132 and the pins 15. The inner wall 132 and the pins 15 can increase heat exchange area of the heat exchange device, and thereby cooling the electronic device effectively. The coolant enters the tank 10 via the inlet 102 and exits the tank 10 via the outlet 104 and keep circulating constantly, therefore, the heat in the base 11, the inner walls 132 and the pins 15 is removed from the heat exchange device via the coolant. Furthermore, due to the channel 142 being extend throughout the tank 10 and having a uniform width, the coolant flows at a substantially uniform speed through different portions of the tank 10, which realizes a sufficient and even heat dissipation of the heat exchange device.

According to the foregoing description, the present invention is patentable, and thus is submitted for a patent legally. However, the foregoing description is only one embodiment of the present invention, any equivalent basing on the spirit of the present invention is covered by the following claims.

【Description of the Drawings】

FIG. 1 is an assembled view of a heat exchange device according to a preferred embodiment of the present invention;

FIG. 2 is an exploded, isometric view of the heat exchange device according to a preferred embodiment of the present invention; and

FIG. 3 is an exploded, isometric view of a conventional heat exchange device.

【Labels of the Main Components】

tank	10	cover	30
inlet	102	outlet	104
base	11	hole	112
sidewall	122	inner wall	132
channel	142	pin	15

Claims:

1. A heat exchange device comprising:

a tank having a plurality of inner walls defining a channel therein, a plurality of pins being disposed in the channel;

a cover hermetically sealing the tank;

an inlet and an outlet communicating with the channel for coolant entering and exiting the tank.

2. The heat exchange device as described in claim 1, wherein the tank comprising a base and two pairs of sidewalls corporately defining a rectangular frame on the base.

3. The heat exchange device as described in claim 1, wherein the tank comprises a base and a sidewall defining a cylindrical frame on the base.

4. The heat exchange device as described in claim 2 or 3, wherein the inner walls and the sidewalls are equal in height.

5. The heat exchange device as described in claim 1, wherein the inlet and the outlet respectively correspond to two ends of the channel.

6. The heat exchange device as described in claim 2, wherein the inner walls extend alternately and oppositely from two opposite ones of the sidewalls, the inner walls being spaced to each other.

7. The heat exchange device as described in claim 6, wherein a distance exists between a free end of each of the inner walls and a corresponding opposite sidewall, and wherein the distance is substantially equal to a distance between two adjacent ones of the inner walls.

8. The heat exchange device as described in claim 2, wherein the inlet and the outlet are disposed at a same one of the sidewalls.

9. The heat exchange device as described in claim 2, wherein the inlet and the outlet are respectively disposed at two opposite ones of the sidewalls.

10. The heat exchange device as described in claim 3, wherein the inner walls extend alternately and oppositely from a cylindrical inner face of the sidewall.

11. The heat exchange device as described in claim 10, wherein a distance exists between a free end of each of the inner walls and the inner face of the sidewall, and wherein the distance is substantially equal to a distance between two adjacent ones of the inner walls.

12. The heat exchange device as described in claim 1, wherein the pins perpendicularly extend from the base toward the cover.

13. The heat exchange device as described in claim 2 or 3, wherein the pins are less than the sidewalls in height.

14. The heat exchange device as described in claim 2 or 3, wherein the pin are equal to the sidewalls in height.

15. The heat exchange device as described in claim 1, wherein the pins are cylindrical.

16. The heat exchange device as described in claim 1, wherein the pins are prismy.

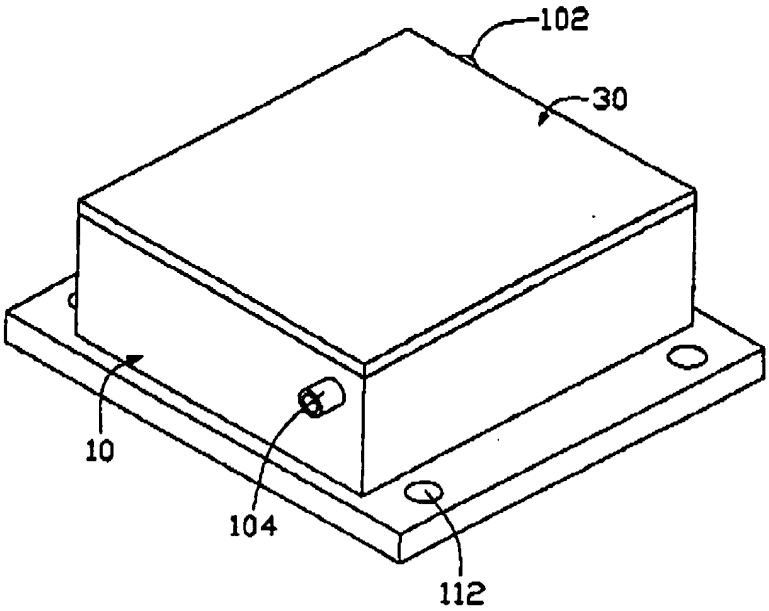

FIG. 1

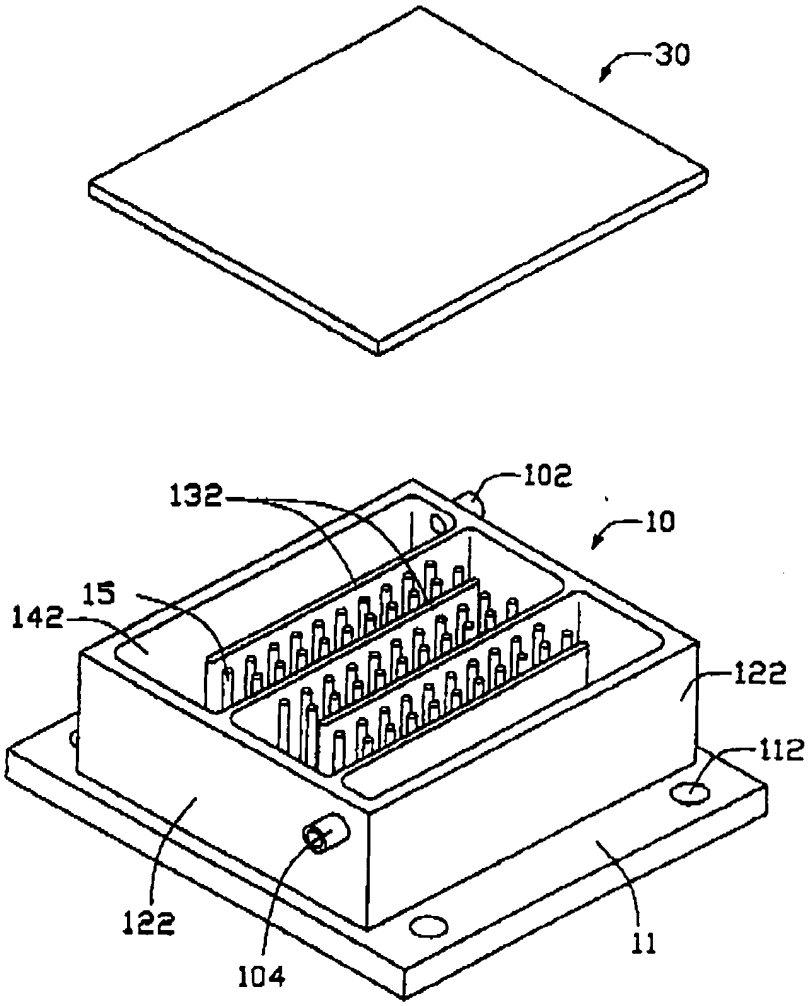

FIG. 2

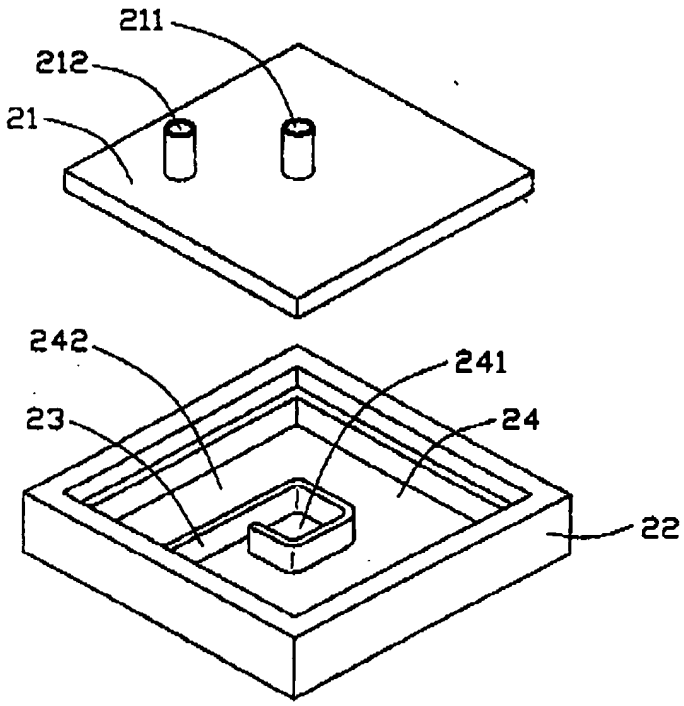

FIG. 3